Arkema's Third Response to EPA Information Request Pursuant to the Clean Air Act Section 114(a), for the Arkema Crosby Plant, received Sept. 7, 2017

III. QUESTIONS

1. Please provide a detailed description and timeline of the event. Include the best known start time and duration of the incident. The timeline should address in detail the following events as well as any other relevant points:

   a. Primary power failure.

   b. Use of backup power supply and subsequent failure.

   c. Use of liquid nitrogen and related equipment and subsequent failure.

   d. Removal of organic peroxides material to each of the nine refrigerated trailers, and which specific organic peroxides materials were placed in each trailer.

   e. Relocation of each of the nine refrigerated trailers.

   f. Temperature readings on each of the nine trailers.

   g. Failure of primary and backup refrigeration systems in trailers.

   h. Initial ignition and combustion of materials in each of the nine trailers.

   i. Controlled burn of each trailers.

   j. Other emergency response activities.

RESPONSE:

Please refer to the preliminary timeline of the event that was submitted with Arkema's initial response on September 18. An Enhanced Timeline was provided with the second response – Hurricane Harvey Event and Materials Provided to EPA and Unified Command.

This third response provides additional information in response to Question 1(f), namely, temperature readings from those trailers from which temperature readings were received. Three trailers were not equipped with remote temperature monitoring equipment.

2. Please provide any documents associated with the identification of hazards posed by organic peroxides at your facility, operating procedures related to organic peroxides, and procedures related to flood, hurricane, loss of power, and emergency operations, and shutdown.

RESPONSE:

Please refer to the Safety Data Sheets for the organic peroxides at the Crosby facility that require refrigerated storage, Emergency Response Plan, Hurricane Preparedness Plan, Risk Management Plan, and Process Hazard Analysis for Organic Peroxide Storage that were submitted with Arkema's initial response on September 18. Submitted with the second response were the Crosby Plant Products Storage Directory, Storage Building Limits and Safety Guidelines procedure, and Nitrogen Transfer Procedure.

No additional information is being submitted with this third response in response to Question 2.

3. What are the names and Chemical Abstract Service (CAS) Numbers of the organic peroxides moved to the refrigerated trailers?

a. How and where are organic peroxides normally stored at the facility?

b. How much organic peroxides are stored at the facility at any one time?

c. What layers of protection or other release prevention measures are in place for the storage of organic peroxides on site?

d. Under what conditions are organic peroxides moved to refrigerated trailers? Prior to the incident, when and for how long did you store materials, including organic peroxides, in refrigerated trailers?

e. Are organic peroxides ever moved off site for safe storage? If so, where are they moved, and what conditions trigger such movement?

RESPONSE:

Please refer to the Safety Data Sheets for the organic peroxides at the Crosby facility that require refrigerated storage, 2016 Tier II Report, and On-Site Inventories of raw and finished material for August 28-29, 2017 that were submitted with Arkema's initial response on September 18.

The following additional information responsive to Question 3(c) was submitted with the second response:

1. The primary refrigeration system (main power supplied from third party electric company) is used to keep the low temperature Organic Peroxides

(OP) at their designated storage temperature. To keep the OPs at their designated storage temperature, the following engineering and administrative controls are employed:

a. A backup or redundant compressor is provided for each building in case of compressor failure on the refrigeration system.

b. A Temperature Alarm is also installed within each refrigerator building to notify an operator if the temperature inside begins to rise above the set point for the building. An alarm triggers operator response to identify the source of the temperature deviation.

c. In addition to the above, operators make rounds in the storage area every two (2) hours to visually check temperature/status of each refrigerator building.

2. If the primary source of power fails, each Refrigerator building is equipped with a diesel powered backup generator to power the refrigeration system.

3. If the refrigeration system on a single refrigerated building has been compromised (due to loss of primary and backup power), the product for that building can be moved to either a building which still has power or to a Reefer Storage Trailer.

4. A Nitrogen Cooling system is also available to cool a building which has lost power/refrigeration.

Additional information in response to Question 3 is provided with the response to Question 4(b) below.

4. What backup power and safety systems were in place prior to the flooding?

a. What "Recognized And Generally Accepted Good Engineering Practices" are followed by Arkema for the design, installation, operation, maintenance, and reliability of the backup power and safety system?

b. What were the engineering and administrative controls for the safety and power systems, and what were their known consequences of failure, and what additional safety measures were in place in event of such failure?

RESPONSE:

Please refer to the Process Hazard Analysis for Organic Peroxide Storage that was submitted with Arkema's initial response on September 18, and to additional information provided in Arkema's second response on September 22.

The following additional information in response to Question 4(a) is submitted with this third response:

i. NFPA 400: Hazardous Materials Code.
ii. NFPA 70E: National Electric Code.
iii. Storage Building Limits and Safety Guidelines OPRS0552

The following information in response to Question 4(b) is submitted with this third response:

i. The primary refrigeration system (main power supplied from third party electric company) is used to keep the low temperature Organic Peroxides (OPs) at their designated storage temperature. Both loss of power and loss of cooling have the same consequence of failure. As an OP warms up, it has the potential to reach a product-specific Self-Accelerating Decomposition Temperature (SADT) and then decompose. This decomposition can generate a flammable vapor with potential for a fire. To keep the OPs at their designated storage temperature, the following engineering and administrative controls are employed:

    1. A backup or redundant compressor is provided for each building in case of compressor failure on the refrigeration system.

    2. Multiple temperature indicators are available and calibrated quarterly.

    3. A Temperature Alarm is also within each refrigerator building to notify an operator if the temperature inside begins to rise above the set point for the building. Visual and audible alarms trigger operator response to identify the source of the temperature deviation. Alarms also function during power interruption and generator operation.

    4. Automatic temperature controllers are also available.

    5. LEL detectors with alarms are installed to detect decomposition products in each building.

    6. In addition to the above, operators make rounds in the storage area every two (2) hours to visually check temperature/status of each refrigerator building.

ii. If the primary source of power fails, each refrigerated building is equipped with a diesel powered backup generator to power the refrigeration system.

iii. If the refrigeration system on a single refrigerated building has been compromised (due to loss of primary and backup power), the product for that building can be moved to either a building which still has power or to a Reefer Storage Trailer.

iv. A Nitrogen Cooling system is also available to cool a building which has lost power/refrigeration.

5. What measures did Arkema take in response to the flooding to minimize consequences of an accidental release or fire/explosion involving either RMP-regulated substances or other hazardous chemicals held at the site, including organic peroxides?

RESPONSE:

Please refer to the timeline included in the response to Question 1 that was submitted with Arkema's initial response on September 18. The following additional information was submitted with the second response:

Please see the information provided above in response to Question 1 in this second response.

There was no accidental release of any RMP-regulated substance at the site during the flooding incident. Arkema took a number of actions in concert with Unified Command to prevent an accidental release of RMP-regulated substances, and these were successful.

There was an overflow of some hazardous materials from the site's open-topped wastewater storage tanks. The plant personnel took a number of actions prior to and during the storm (prior to power becoming unavailable and the secondary containment becoming overtopped by rising flood water), such as pumping water to the site's UIC system, reducing freeboard within the secondary containment, and the like. Rising flood waters coupled with power being unavailable eventually overcame all efforts to prevent the accidental release of this material. A copy of Arkema's STEERS report on this accidental release was included with the initial response to the Information Request.

The response to Question 4(b) above is also incorporated in this third response in response to this Question 5.

List of Attachments

Temperature Readings from Trailers